

**MIXER HAVING LOW NOISE, CONTROLLABLE GAIN, AND/OR LOW  
SUPPLY VOLTAGE OPERATION**

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**ABSTRACT OF THE DISCLOSURE**

A mixer includes a reference current source, a programmable gain RF transconductance section or an RF transconductance section, switching quad native transistors or switching quad transistors, and a folded-cascoded common mode output section or an output section. When the mixer included the programmable gain RF transconductance section, the gain of the mixer is adjustable. When the mixer includes the switching quad native transistors, flicker noise of the mixer is reduced. When the mixer includes the folded-cascoded common mode output section, the mixer operates reliably from low supply voltages.